The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

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6. (Currently amended) The method of claim ~~5~~ 49 wherein the sample space scores are normalized with respect to each sample space mode and selecting a cut-off is further based on determining when the distributions of the normalized sample space scores for each sample space mode start to vary by more than an acceptable amount.

7. (Previously presented) A method of constructing a vector space in which a data sample relating to an object may be encoded, comprising:

providing a raw matching score between each of a plurality of basis sample elements and each of a plurality of data samples in a first sample database, the samples in the first sample database being out-of-sample with respect to the basis sample elements;

constructing a sample space from the raw matching scores, the sample space being defined by a basis set of sample space modes;

determining a first common object sample space score between each of a plurality of data samples in a first common object sample database and each of the sample space modes;

determining a second common object sample space score between each of a plurality of data samples in a second common object sample database and each of the sample space modes, the first and second common object sample databases each having a set of different samples for the same objects; and

constructing a recognition space from the first common object sample space scores and the second common object sample space scores, the recognition space being defined by a basis set of recognition space modes.

8. (Original) The method of claim 7 wherein the sample space scores are normalized with respect to each sample space mode before constructing the recognition space.

9. (Previously presented) The method of claim 8 wherein constructing the recognition space comprises: generating a second covariance matrix for the sample space modes from the first common object sample space scores and the second common object sample space scores; and determining the eigenvectors and eigenvalues of the second covariance matrix, the eigenvectors of the second covariance matrix specifying the recognition space modes.

10. (Original) The method of claim 9 further comprising: generating a second rotation matrix, based on the eigenvectors of the second covariance matrix, the second rotation matrix mapping sample space scores into recognition space scores.

11. (Original) The method of claim 10 further comprising: truncating the recognition space by eliminating a subset of the recognition space modes, the eliminated recognition space modes generally having the highest eigenvalues of the second covariance matrix.

12. (Original) The method of claim 11 wherein truncating the recognition space comprises:

determining a recognition space score between each of a plurality of data samples in a third sample database and each of the recognition space modes, the samples in the third sample database being of objects not sampled in the basis samples, the samples in the first sample database, the samples in the first common object database, or the samples in the second common object database; and

selecting a cut-off for eliminating a subset of recognition space modes based on the distribution of said recognition space scores for each of the recognition space modes, the distribution being indicative of whether a recognition mode is generally unsuitable for recognizing different samples of the same object.

13. (Original) The method of claim 12 wherein selecting a cut-off is further based on determining when the distributions of the recognition space scores for each sample space mode start to vary by more than an acceptable amount.

14. (Original) The method of claim 7 further comprising: before constructing the recognition space, truncating the sample space by eliminating a subset of the sample space modes; and truncating the recognition space by eliminating a subset of the recognition space modes.

15. (Original) The method of claim 7 wherein the recognition space is constructed using linear discriminant analysis.

16. (Original) The method of claim 7 wherein the recognition space is constructed using non-linear discriminant analysis.

17. (Original) The method of claim 7 further comprising selecting the plurality of basis sample elements at random.

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23. (Previously presented) The method of claim 7 further comprising:

providing a raw matching score between said data sample and each of the plurality of basis sample elements;

mapping the raw matching scores of said data sample into sample space scores; and

mapping the sample space scores of said data sample into recognition space scores.

24. (Currently Amended) The method of claim 23 further comprising:

encoding ~~the~~ known data samples into recognition space scores in the recognition space, and storing the recognition space scores in a reference database;

encoding the ~~probe~~ data sample as a probe data sample into recognition space sores in the recognition space;

measuring the distance between the recognition space scores for the probe data sample and each known data sample in the recognition space; and

determining which encoded known data sample is nearest to the encoded probe data sample in the recognition space.

25. (Previously presented) The method of claim 14 further comprising:

providing a raw matching score between said data sample and each of the plurality of basis sample elements;

mapping the raw matching scores of said data sample into truncated sample space scores; and

mapping the sample space scores of said data sample into truncated recognition space scores.

26. (Currently amended) The method of claim 25 further comprising:

encoding ~~the~~ known data samples into truncated recognition space scores in the truncated recognition space, and storing the recognition space scores in a reference database;

encoding the ~~probe~~ data sample as a probe data sample into truncated recognition space scores in the truncated recognition space;

measuring the distance between the truncated recognition space sores for the probe data sample and each known data sample in the truncated recognition space; and

determining which encoded known data sample is nearest to the encoded probe data sample in the truncated recognition space.

27. (Currently amended) The method of claim ~~24~~ 7 wherein the objects are persons, the data samples represent faces of the persons, and the method is used to perform face recognition.

28. (Currently amended) The method of claim ~~26~~ 7 wherein the objects are persons, the data samples represent fingerprints of the persons, and the method is used to perform fingerprint recognition.

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35. (Previously presented) For use in object recognition, a space construction and encoding system comprising:

a sample space construction module for receiving a data sample relating to an object to be encoded, a plurality of basis sample elements, and a plurality of data samples in a first sample database, the samples in the first sample database being out-of-sample with respect to the basis samples; the sample space construction module providing a raw matching score between each of the plurality of basis sample elements and each of the plurality of data samples in the first sample database, and constructing a sample space from the raw matching scores, the sample space being defined by a basis set of sample space modes;

a recognition space construction module for receiving a plurality of data samples in a first common object sample database and a plurality of data samples in a second common object sample database, the first and second common object sample databases each having a set of different samples for the same objects; wherein the recognition space construction module determines a first common object sample space score between each of the plurality of data samples in the first common object sample database and each of the sample space modes and further determines a second common object sample space score between each of the plurality of data samples in the second common object sample database and each of the sample space modes, the recognition space construction module constructing a recognition space from the first common object sample space scores and the second common object sample space scores, the recognition space begin defined by a basis set of recognition space modes.

36. (Currently amended) The system of claim 35 wherein the sample space scores are normalized with respect to each sample space mode before construction of the recognition space.

37. (Original) The system of claim 36 wherein the recognition space construction module generates a second covariance matrix for the sample space modes from the first common object sample space scores and the second common object sample space scores, the recognition space construction module further determining the eigenvectors and eigenvalues of the second covariance matrix, the eigenvectors of the second covariance matrix specifying the recognition space modes.

38. (Original) The system of claim 37 wherein the recognition space construction module further generates a second rotation matrix, based on the eigenvectors of the second covariance matrix, the second rotation matrix mapping sample space scores into recognition space scores.

39. (Original) The system of claim 38 further comprising a recognition space truncation module for truncating the recognition space by eliminating a subset of the recognition space modes, the

eliminated recognition space modes generally having the highest eigenvalues of the second covariance matrix.

40. (Original) The system of claim 35 further comprising: a sample space truncation module for truncating the sample space by eliminating a subset of the sample space modes; and a recognition space truncation module truncating the recognition space by eliminating a subset of the recognition space modes.

41. (Original) The system of claim 35 wherein the recognition space construction module uses linear discriminant analysis in constructing the recognition space.

42. (Original) The system of claim 35 wherein the recognition space construction module uses non-linear discriminant analysis in constructing the recognition space.

43. (Original) The system of claim 35 wherein the plurality of basis sample elements are selected at random.

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45. (Original) The system of claim 35 wherein the objects are persons, the data samples represent faces of the persons, and the system is used to perform face recognition.

46. (Original) The system of claim 35 wherein the objects are persons, the data samples represent fingerprints of the persons, and the system is used to perform fingerprint recognition.

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49. (New) A method of constructing a vector space in which a data sample relating to an object may be encoded, comprising:

providing a raw matching score between each of a plurality of basis sample elements and each of a plurality of data samples in a first sample database, the samples in the first sample database being out-of-sample with respect to the basis sample elements;

constructing a sample space from the raw matching scores, the sample space being defined by a basis set of sample space modes, by generating a covariance matrix for the basis elements from the raw matching scores; and determining the eigenvectors and eigenvalues of the covariance matrix, the eigenvectors specifying the sample space modes;

generating a rotation matrix, based on the eigenvectors of the covariance matrix, the rotation matrix mapping raw matching scores into sample space scores; and

truncating the sample space by eliminating a subset of the sample space modes, the eliminated modes generally having the lowest eigenvalues, by determining a sample space score between each of a plurality of data samples in a second sample database and each of the sample space modes, the samples in the second sample database being out-of-sample with respect to the basis samples and the samples in the first sample database; and selecting a cut-off for eliminating a subset of sample space modes based on the distribution of said sample space scores for each of the sample space modes, the distribution being indicative of how well a sample space mode is able to discriminate between samples.